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SCIENTIFIC PYE INSTRUMENTS

KELVIN BRIDGE. Cat. No. 7415

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WETENSCHAPPELIJKE INSTRUMENTEN
MAASTRICHT
Minckelersstr. 3B.
Tel. 3363
UTRECHT
Dr. J. P. Thijsselaan 19
Tel. 20296.

W. G. PYE & CO. LTD., GRANTA WORKS, CAMBRIDGE, ENGLAND
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W. G. PYE & CO., LTD.,

"GRANTA" WORKS, CAMBRIDGE, ENGLAND.

Manufacturers of Scientific
Instruments for Industrial
and Academic Research.

Telephone:- Cambridge 4032, Telegraphic Address:- Pye Cambridge.

KELVIN BRIDGE. Cat.No. 7415.

DESCRIPTION AND OPERATING INSTRUCTIONS.

CIRCUIT.

The variable arm of the bridge consists of a decade of 10 milliohms steps and a graduated slide-wire of 10 milliohms. Each division of the slide-wire scale is 20 microhms, The decade switch contact, and the slide-wire brush contact, are in series with the ratio arms so that the resistance of these contacts has little effect on the balance point.

Two sets of ratio arms are provided and selected simultaneously by a ganged switch, giving multiplying factors of 0.01, 0.1, 1, 10 & 100.
The ratio arms extend the range of the bridge so that with the x 0.01 multiplier each division becomes 0.2 microhm and a resistance of 0.1 microhm can be detected, while with the x 100 multiplier a resistance of 11 ohms can be measured.

Current and potential terminals are fitted for connection to the resistor under test. The bridge is supplied with links joining each current terminal to its associated potential terminal. These links are removed when testing very low resistances, which are assumed to be of the four-terminal type, and the bridge then acts as a normal double Kelvin Bridge, in which the resistance of the connecting leads does not materially influence the answer.

The three galvanometer terminals and two galvanometer keys are provided to enable reduced sensitivity to be used during the initial balancing. Their operation is described below under “Galvanometer Connection".

OPERATION.

Battery Connection.

Connect a source of ourrent with suitable oontrol arrangements to the battery terminals. No current oontrol is provided in the bridge itself and, as the bridge is of very low resistance, sufficient external resistance must be provided to limit the ourrent to the required value. The current must not exceed 10 amps.

Galvanometer Connection.

If a two-terminal galvanometer with no added resistanoe such as our Freely Suspended Reflecting Galvanometer Cat.No. 7940, is being used, this should be connected to terminals G and GF. The galvanometer key marked FINAL will then operate the galvanometer at full sensitivity, while the INITIAL key will be inoperative. External shunts can readily be added and connected as shown in the circuit diagram to allow both INITIAL and FINAL keys to be used and so provide the facility of reduced sensitivity during initial balancing. In this case the values of the resistances required are as follows:-

If Rg = galvanometer resistance,
Rd = external criticial damping resistance,
X = sensitivity reduction factor,

then

R2 = X Rd,
R1 = Rd - R2,
Rs = R1 (Rg - R2)/(Rd + Rg).

If the highest sensitivity is not required, our Taut-Suspension Reflecting Galvanometer Cat.No. 7901 may be used. This galvanometer has a built-in Ayrton-Mather Shunt. In this case galvanometer terminals G+ & G- should be connected to bridge terminals G & GF, and galvanometer terminal X0.01 to bridge terminal GI. The INITIAL key will then operate the galvanometer at X0.01 sensitivity.

Measurement of Four-Terminal resistors.

Remove the links betwecn C - P & C1 - P1. Connect the Current terminals of the resistor to terminals C & C1, and the potential terminals to P & P1.

The resistances of the connecting leads have a small effect on the balance point. To prevent errors occuring of greater than 0.05% the resistances should not exceed the following values:-

Potential Leads.	0.01 multiplier, 1 milliohm 0.1 multiplier, 10 milliohms, Other multipliers, 50 milliohms.
Current Leads.	Test resistance of less than 10 milliohms, 20 times the value of the test resistance Larger test resistances, no limit.

After switching on the current a balance should be obtained by adjustment of the multiplier, switch setting, and slide-wire setting whilst operating the galvanometer key or keys. The value of the test resistance in milliohms is then given by the sum of the switch and slide-wire settings, multiplied by the multiplier value.

Measurement of two-terminal resistors.

Insert links between C - P and C1 - P1. Connect the test resistor to terminals P & P1 via low-resistance leads. Short the leads together at the test resistor and obtain a balance as previously described. Unshort the leads, connect to the test resistor, and obtain a new balance. The difference between the two readings is the value of the test resistance.

This method becomes inaccurate when the resistance of the leads is comparable with that of the resistor, and should not be used in general for resistors of less than 1 ohm.

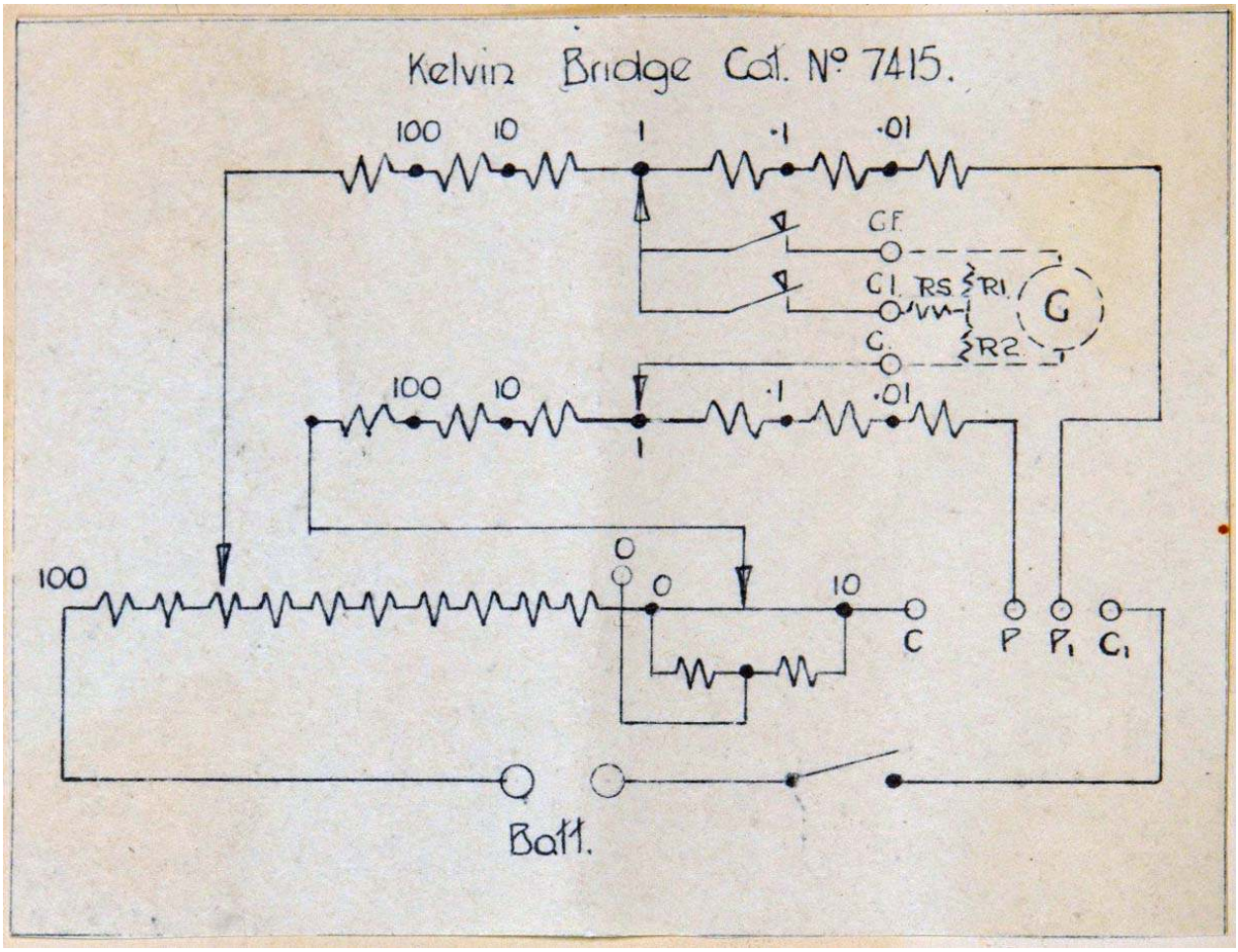
ACCURACY.

The accuracy of the bridge is ± 0.05% or ± 1 slide wire division, whichever is the greater.

P.T.O. For Circuit Diagram.

Serial No: 17/1-52/K.B. [? 17-Jan-1952 ?]
ISSUED BY W.G.PYE & CO., LTD., GRANTA WORKS, CAMBRIDGE, ENGLAND.

Circuit Diagram (Manual)



Note: Circuit Diagram, paper size ± 10x13 cm (± 4"x5"), pasted in the manual (A4 format).

[End of Manual]

Note: OCRed document. Some characters may be misinterpreted. Amsterdam, 2026-03-03.

SCIENTIFIC PYE INSTRUMENTS

Certificate of Test

This is to certify that the instrument named below has been tested at 20°C and found to lie within the limits of the accuracy stated.

NAME OF INSTRUMENT Kelvin Bridge

Cat. No. 7415 Serial No. 27,300

Accuracy ± 0·05% or One Scale Division whichever is the greater.

Tested by J. G. R. Dowsett. Date 1. 10. 54.

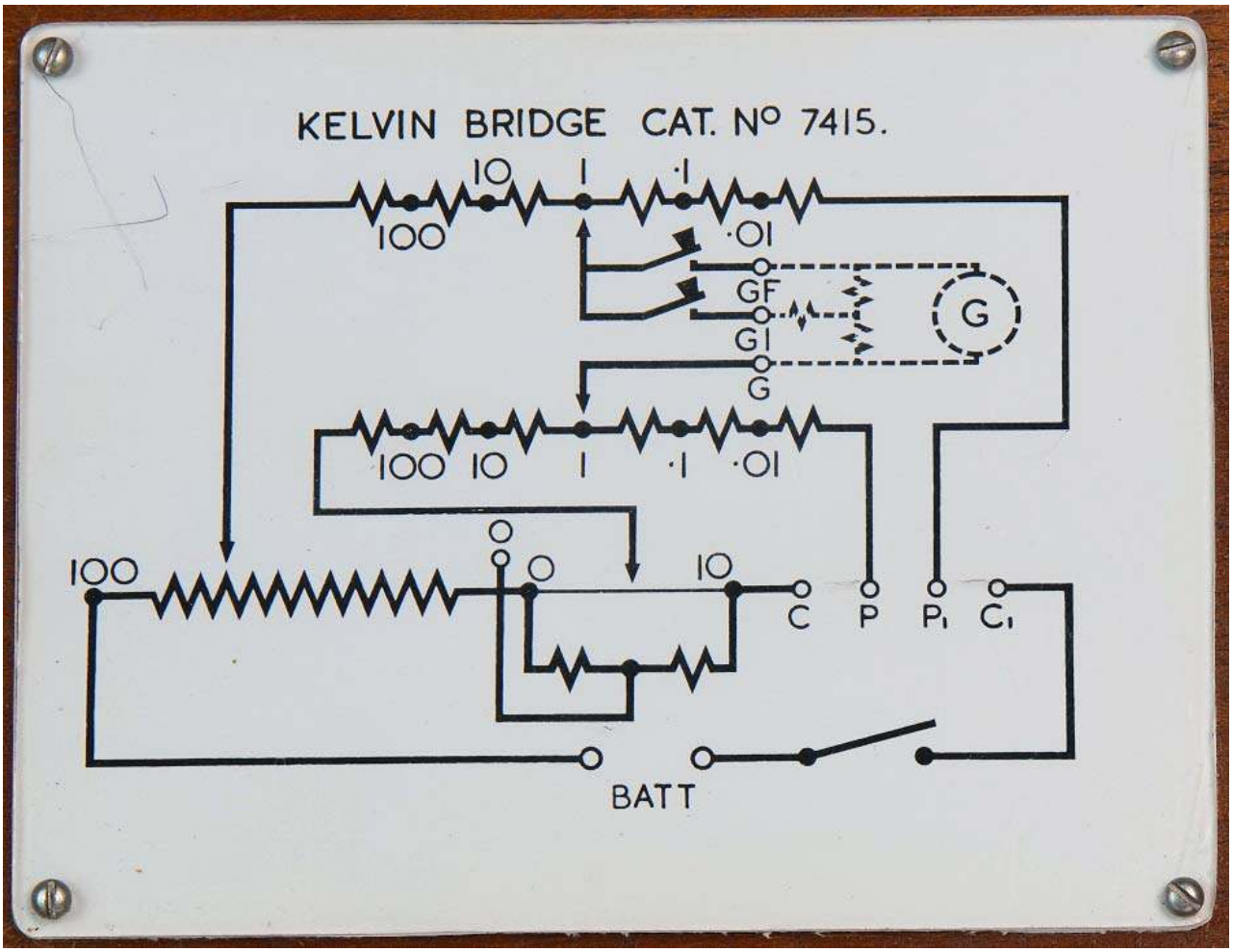
Checked by J. J. Patman Date 1. 10. 54.

Inspected by Date 1 OCT 1954

W. G. PYE & CO. LTD., GRANTA WORKS, CAMBRIDGE, ENGLAND

TELEPHONE CAMBRIDGE 4032 TELEGRAMS PYE CAMBRIDGE

Circuit Diagram (Inside Cabinet)



Following pages two **Pictures** and two pages **Leaflet** "PYE Kelvin Bridge"

PYE Kelvin Bridge in Mahony Cabinet

W.G.PYE & Cº LTD CAMBRIDGE
Nº 27.300
10 AMPS MAX
OFF
ON
BATT
BATTERY
C
P
MILLIOHMS
Pı
Cı
RATIOS
INITIAL
G
FINAL
G
GALVANOMETER
GF
GI
MILLIOHMS
MADE IN ENGLAND
MAASTRICHT
GOFFIN

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KELVIN BRIDGE

WIDE RANGE • HIGH ACCURACY • EASY TO OPERATE

W. G. PYE & CO. LTD., GRANTA WORKS, CAMBRIDGE, ENGLAND

KELVIN BRIDGE

Catalogue Number 7415

For the accurate measurement of low resistance the double Kelvin bridge circuit is the most convenient. The Pye Kelvin Bridge Cat. No. 7415 covers a very wide range with extreme ease of operation

CIRCUIT

The variable arm of the bridge consists of a decade in 10 milliohm steps and a graduated slide-wire of 10 milliohms. The decade switch contact and the slide-wire brush contact are in series with the ratio arms so that the resistance of these contacts has little effect on the balance point.

RANGE

0.1 microhm to 11 ohms.
Each division of the slide-wire scale is 20 microhms on the x 1 range.
Maximum test current:— 10 Amps.

MULTIPLIERS

Two sets of ratio arms are provided and these are switched simultaneously by a graduated switch to give multiplying factors of x0.01, x0.1, x1, x10 and x100. These extend the range of the bridge so that with the xO.Ol multiplier each dial division becomes 0.2 microhm and a resistance of 0.1 microhm can be detected. Similarly with the x 100 multiplier a resistance of 11 ohms can be measured.

ACCURACY

± 0.05% or ±1 slide-wire division (whichever is the greater).

PRESENTATION

Current and potential terminals are fitted for connecting the resistor under test. The bridge is supplied with links joining each current terminal to its associated potential terminal. These links are removed when testing very low resistances which are assumed to be of the four-terminal type. The bridge then acts as a normal double Kelvin Bridge in which the resistance of the connecting leads does not materially influence the answer. The double bridge connection is advised for all resistances of less than 1 ohm.

GALVANOMETER KEYS

Initial and Final balance keys are provided to bring the external galvanometer into circuit for bridge-balancing. These are built-in to the panel of the instrument.

RECOMMENDED GALVANOMETERS

The Pye Freely-suspended Reflecting Galvanometer Cat. No. 7940 (see separate leaflet) provides the highest sensitivity. When this gavanometer is directly connected to the bridge however the Initial balance key will be inoperative. To provide protection an external shunt may be connected as described in the **Operating Instructions** supplied with the bridge.

If the highest sensitivity is not required, the Pye Taut-Suspension Reflecting Galvanometer Cat. No. 7901 is suitable. This galvanometer has a built-in Ayrton-Mather shunt and by appropriate connection to the Kelvin Bridge the Initial balance key operates the galvanometer at xO.Ol sensitivity. The Final balance key then provides the full sensitivity of the galvanometer.

SIZE 18" x 10" x 9½" WEIGHT 20 lbs.

W. G. PYE & CO. LTD., GRANTA WORKS, CAMBRIDGE, ENGLAND
TELEPHONE CAMBRIDGE 4032 TELEGRAMS PYE CAMBRIDGE

38/10M/1-54/KB/A